

Return of Nipah virus: Bangladesh perspective

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Abstract

Nipah virus is a newly-emerging and deadly zoonotic disease that causes fever and encephalitis in humans. Bangladesh, in particular has experienced a good number of outbreaks in recent times, therefore the infection has become endemic in the sub-continent. Simple preventive measures could stop the transmission and reduce the fatality of the infection. Healthcare workers from public and private sectors, Peoples representatives, NGOs, local administration, print and electronic media, teachers could play a vital role in creating awareness among the affected people in the endemic region.

Keywords: *Nipah virus, infection, outbreaks, prevention, awareness*

Introduction

Nipah virus (NiV) is an emerging zoonotic virus (a virus transmitted to humans from animals). The virus is named after the location where it was first detected in Malaysia back in 1998^{1,2}. Subsequent human cases were reported in Bangladesh³ and India⁴. In infected people, Nipah virus causes severe illness characterized by inflammation of the brain (encephalitis) or respiratory diseases (WHO 2001)⁵. It can also cause severe disease in animals such as pigs, resulting in significant economic losses for farmers.

Together with the Hendra virus, NiV is now recognized as a new genus, Henipavirus (Hendra + Nipah), in the Paramyxoviridae family. They are single-stranded RNA viruses, approximately 15,000 nucleotides long

Reservoir

Based on serologic and virologic evidences, it is currently believed that certain species of fruit bats, *Pteropus* spp. are the natural hosts of Nipah viruses^{6,7}. They are distributed across an area encompassing northern, eastern and south-eastern areas of Australia, Indonesia, Malaysia, the Philippines and some of the Pacific Islands. The bats appear to be susceptible to infection with these viruses, but do not themselves become ill.

Clinical and pathological manifestations

Human infections range from asymptomatic infection to fatal encephalitis. Infected people initially develop influenza-like symptoms of fever, headaches, myalgia (muscle pain), vomiting and sore throat. This can be followed by dizziness, drowsiness, altered consciousness, and neurological signs that indicate acute encephalitis⁸. Some people can also experience atypical pneumonia and severe respiratory problems, including acute respiratory distress^{9,10}. Encephalitis and seizures occur in severe cases, progressing to coma within 24 to 48 hours. The case fatality rate is

estimated at 40% to 75%; however, this rate can vary by outbreak depending on local capabilities for surveillance investigations.

The exact incubation period of NiV disease in humans is not known but ranged from several days to 2 months, but was 2 weeks or less in the majority of patients. A multiorgan vasculitis associated with infection of endothelial cells was the main pathologic feature of NiV infection¹¹, with infection being most pronounced in the central nervous system where a diffuse vasculitis characterized by segmental endothelial cell damage, mural necrosis, karyorrhexis, and infiltration with polymorphonuclear leukocytes and mononuclear cells is noted. Immunohistochemistry (IHC) assays showed intense staining of endothelial and parenchymal cells; multinucleated giant cells characteristic of paramyxovirus infections are observed in the vascular endothelium. However, evidence of endothelial infection and vasculitis were also observed in other organs, including lung, heart, spleen, and kidney.

NiV has been isolated from cerebrospinal fluid, tracheal secretions, throat swabs, nasal swabs, and urine specimens of patients¹². A harsh, nonproductive cough (called the mile long cough) was a prominent clinical feature but other signs such as lethargy or aggressive behavior indicated some neurological involvement¹³.

Transmission and Outbreaks

The world has witnessed nine outbreaks of Nipah virus since 1998, all within Bangladesh and neighboring parts of India. Figure 1 summarizes all these episodes based on the data available in Wikipedia and internet editions of Daily Star newspaper^{14,15}. Based on the figure, it can be said that the NiV outbreaks take place usually in the first quarter of English calendar, and in northern part of Bangladesh; the areas which experience a cold wintry season during that period of time. This indicates the psychrophilic nature of the virus. In

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these outbreaks, consumption of fruits or fruit products (e.g. raw date palm juice) contaminated with urine or saliva from infected fruit bats was the most likely source of infection. The pace of virus transmission gained acceleration when it was found during the outbreak in Faridpur, Bangladesh in 2004 that the person-to-person transmission of Nipah virus could be by means of large droplet dispersal that eventually caused acute respiratory distress syndrome to some of the victims^{9,10,14}.

Diagnosis

Nipah virus infection can be diagnosed by a number of different tests:

1. virus isolation from blood, throat swab, CSF and urine samples
2. virus isolation by cell culture, viz. Vero, RK-13, BHK or porcine spleen cell lines.
3. detection of antigens or nucleic acids by serology
4. serum neutralization (antibodies of NiV are found in serum)
5. Histopathology from affected organ
6. enzyme-linked immunosorbent assay (ELISA)
7. Reverse transcriptase- polymerase chain reaction (RT-PCR) assay
8. immunofluorescence assay.

Control and Prevention

From figure 1, it is depicted that the case fatality of NiV infection in nine of its outbreaks averages 64% (±24%). Such a high level of casualty is further agonized by the fact that no vaccines or antiviral drugs are currently available for NiV. During the NiV outbreak in Malaysia, however patients receiving ribavirin either orally or intravenously showed a lower mortality rate. In the absence of a vaccine, the only way to reduce infection in people is by raising awareness of the risk factors and educating people about the measures they can take to reduce exposure to the virus. Public health educational messages should focus on the following.

1. Reducing the risk of bat-to-human transmission: Efforts to prevent transmission should first focus on decreasing bat access to date palm sap. Freshly collected date palm juice should also be boiled and fruits should be thoroughly washed and peeled before consumption.

2. Reducing the risk of human-to-human transmission: Because person-to-person transmission of NiV has been documented, those in contact with patients, including healthcare workers, should use standard droplet precautions during contact with secretions, excretions, and body fluids of patients. Regular hand washing should be carried out after caring for or visiting sick people.

3. Reducing the risk of animal-to-human transmission: Gloves and other protective clothing should be worn while handling sick animals or their tissues, and during slaughtering and culling procedures.

If an outbreak is suspected, the animal premises should be quarantined immediately. Culling of infected animals - with close supervision of burial or incineration of carcasses - may be necessary to reduce the risk of transmission to people. Restricting or banning the movement of animals from infected farms to other areas can reduce the spread of the disease. Quarantine measures like closing of schools could reduce the further spread.

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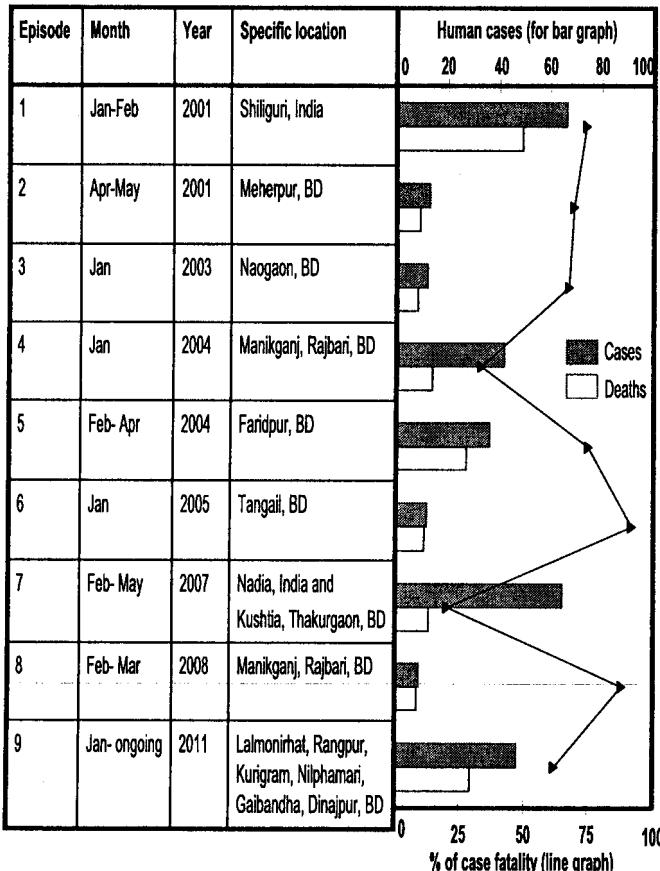


Figure 1: While the bar graph indicates the human victims, the line graph illustrates the rate of mortality of the respective episodes of Nipah virus outbreaks worldwide since 2001.

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